

**MATH 341 — FALL 2011**  
**ASSIGNMENT 1**

August 26, 2011

1. Write each statement in symbolic form, letting the statements be:

$P$ : Romulus is studying.

$Q$ : Remus is studying.

- (a) Both Romulus and Remus are studying.
  - (b) Remus is studying but Romulus is not.
  - (c) Neither Romulus nor Remus is studying.
  - (d) Either Romulus is studying or Remus is not.
  - (e) It is not true that both Romulus and Remus are studying.
  - (f) Either Romulus or Remus is studying.
  - (g) It is not true that both Romulus and Remus are not studying.
2. Assume that the statements  $P$  and  $Q$  in Problem 1 are both true. Which of the compound statements in Problem 1 are then true?
3. Let  $P$  be the statement “*The corn is green*” and  $Q$  be the statement “*The sky is blue*”. Translate the following statements into words.

(a)  $P \vee Q$

(b)  $\sim Q$

(c)  $[\sim Q] \wedge [\sim P]$

(d)  $\sim [P \wedge Q]$

(e)  $P \wedge [\sim Q]$

(f)  $P \wedge Q$

(g)  $\sim [P \vee Q]$

(h)  $\sim [(\sim P) \vee (\sim Q)]$

4. Construct truth tables for the following statements.

(a)  $\sim [P \vee Q]$

(b)  $[\sim P] \wedge [\sim Q]$

(c)  $\sim [\sim P]$

(d)  $P \wedge [\sim Q]$

(e)  $\sim [P \wedge (\sim Q)]$

(f)  $[P \wedge (\sim Q)] \vee [Q \vee (\sim P)]$

(g)  $P \wedge [Q \vee R]$

5. Let  $\underline{P \vee Q}$  be defined as “*P or Q but not both,*” and construct a truth table for this connective.
6. Write the *converse*, *inverse*, and *contrapositive* of each of the following statements.
- (a) *If a triangle is isosceles, then the sides opposite the congruent angles are congruent.*
- (b) *If  $x$  is positive, then  $x \neq 0$ .*